

## **REMARKS**

In response to the above Office Action, pages 6 and 8 of the specification and claim 10 have been amended to correct a typographical error. In addition, page 10 has been amended to include 1-octene as a  $\alpha$ -olefin, support for which can be found in claim 13 as filed. Applicants appreciate the Examiner pointing out these errors and inconsistencies.

Claims 1 and 12 have been amended to make it clear that step (iii) in the claims, where the transition metal compound in a suitable solvent is added, is "to the support material of (ii)." In other words, it is necessarily after the mixture of an aluminoxane and ionic activator formed in step (i) has been added to the support material in step (ii). Support for this can be found throughout the specification and in Example 1. This order of addition is an important feature of applicants' invention.

Another important feature is the specific use of aluminoxane in the claimed process for making the supported transition metal catalyst system.

In the Office Action, the Examiner rejected claims 1-14 under 35 U.S.C. §103(a) for being obvious over U.S. Patent No. 5,783,512 to Jacobsen et al., hereafter Jacobsen '512. In addition, claims 1-15 were rejected under §103(a) for being obvious over U.S. Patent No. 6,271,165 to Jacobsen et al., hereafter Jacobsen '165.

Both references disclose methods for forming supported transition metal catalysts and processes for using the catalysts for the polymerization of ethylene.

In both references, however, the support is optional and the order of addition of the specific components is not critical. See Jacobsen '512 at column 17, lines 28-35 and Jacobsen '165 at column 26, line 58 to column 27, line 3. Both also describe a large number of different organometal compounds that may be used including

aluminoxanes of which alkylaluminum compounds are preferred. See Jacobsen '512 at column 13, line 25 to column 14, line 29 and Jacobsen '165 at column 21, line 56 to column 23, line 33.

In contrast, the method of the present invention requires specific use of an aluminoxane rather than any alternative organometal compound, use of a support, and specific order of addition of the components, wherein the aluminoxane and the ionic activator are mixed together and added to the support prior to the addition of a transition metal compound.

The invention, and in particular the use of aluminoxanes, has been found to result in an advantageous activity profile for the resultant catalysts (see page 2, 6<sup>th</sup> paragraph of the specification). In the Examples, this is represented by a much lower reaction exotherm than conventionally observed.

In addition, the invention has also been found to give a polymer with higher melt strength. See Example 3, page 12, last line of the specification.

Enclosed in support of the results applicants achieved by preparing the supported catalyst according to the present invention is a Declaration of Grant Berent Jacobsen, one of the inventors of this application. It is to be noted that Mr. Jacobsen is also the first inventor of Jacobsen '512 and Jacobsen '165. Thus Mr. Jacobsen is thoroughly familiar with the teachings of both of these references and the differences between them and the present invention.

In the Declaration, Mr. Jacobsen notes that the Examiner referred to a number of Examples of Jacobsen '512 and Jacobsen '165, referred to as D1 and D2, respectively in the Declaration, but none of these Examples exemplified the use of aluminoxane. On

the contrary, a number of the Examples, e.g., Example 6 of both Jacobsen '512 and '165, exemplify an equivalent method of the present invention, but using an alkylaluminum (triethylaluminum or TEA) as the organometal.

Accordingly, as set forth in Appendix 1 attached to the Declaration, Mr. Jacobsen prepared a catalyst comparable to Example 6 of the two references where TEA was used as the organometal compound. This comparative catalyst was then tested under polymerization conditions similar to Example 3 of the present application.

The reaction profile of this comparative catalyst (A) was then compared to that of Example 3 using the catalyst of Example 2 (B) prepared according to the present invention. The results are shown in Fig. 1. As noted by Mr. Jacobsen:

The increase in activity profile shown initially (in Fig. 1) is directly related to the reaction exotherm. It can be seen that the exotherm with the Example according to the present invention (B) is significantly lower than that observed for the equivalent reaction using the comparative catalyst (A), i.e., using a catalyst comparable to those of D1 and D2 formed using an alkylaluminium instead of an aluminoxane. This would be expected to result in an improvement of the operability of the catalyst at industrial scale.

Fig. 2 shows the comparative melt strengths of the polymers using comparative catalyst (A) and inventive catalyst (B). Again, as noted by Mr. Jacobsen.

Again a marked improvement (increase) is shown with the Example according to the present invention (B) compared to the results observed for the equivalent reaction using the comparative catalyst (A), i.e., using a

catalyst comparable to those of D1 and D2 formed using an alkylaluminium instead of an aluminoxane.

Accordingly, even though the references may generally disclose the use of the components of applicants' catalyst and the order of addition of the components, there is no specific teaching in the specification or Examples of the use of an aluminoxane with the specifically claimed order of addition of the components. While this may be sufficient to establish a prima facie case of obviousness, in view of the unexpected and superior results achieved by preparing the catalyst system according to the preset invention compared to the preferred method of the references as exemplified by Example 6 in each as evidenced by the Declaration, it is submitted that this is sufficient to rebut this legal conclusion of obviousness. See M.P.E.P. 716.02(a).(I & II).

Withdrawal of Jacobsen '512 and Jacobsen '165 as grounds of rejection under §103(a) is therefore requested.

It is believed claims 1-15 are in condition for allowance.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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**Attachments:** Declaration of Grant Berent Jacobsen

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